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Dr. Thresh makes occasional reference to permutit for purposes of water softening and recommends its use where the quantity of water to be treated is not large. This substance is coming into vogue both in this country and in Europe. By its use carbonates and sulphates of soda are substituted for the corresponding salts of lime and magnesia.

In discussing lead poisoning it is said that "no water acts upon lead unless both carbon dioxide and oxygen are present. It seems probable that when carbonic acid is in a certain excess a solvent action is exerted, whereas when oxygen is in excess the action is erosive."

The author's treatment of the biology of water is somewhat less detailed than that of its chemistry, but some experiences are related by him which are of interest, as, for example, the effect which the process of water softening has in reducing the number of bacteria in water. The bacteriological discussion is materially strengthened by quotations from Dr. Houston's answers to two specific questions, namely, "What bacteriological proof would you consider conclusive as to the pollution of a water with sewage, or manurial matter, and what bacteriological proof would you consider conclusive that a water is free from such pollution or so free that it is safe for drinking purposes"? The answers to these questions can not be stated in a few words, but Dr. Houston apparently regards a water which never contains *B. coli* in 100 c.c. as safe for drinking; a water which contains *B. coli* in 100 c.c. in less than half the number of samples examined as probably reasonably safe; but a water which contains *B. coli* in 100 c.c. in a majority of samples is one to be viewed with some degree of disfavor. Waters containing *B. coli* in smaller amounts in a majority of samples can not perhaps with absolute certainty be classed as sewage polluted, but the presumptive evidence increases to a more than proportional extent as a 10, a 1 and a 0.1 c.c. standard is infringed. Dr. Houston's standards appear to be somewhat more strict than those commonly discussed in this country.

The section of the book which describes in

detail the mineral constituents of the alkaline waters of the London basin is interesting to analysts. More than four hundred of these analyses are given in detail.

In regard to the methods of analysis little need be said. They do not differ materially from those described in the first edition of the book and represent the ordinary English practise.

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*Herbals, their Origin and Evolution.* A chapter in the History of Botany. 1470-1670. By AGNES ARBER. Cambridge, the University Press. 1912. Octavo. Pp. xviii + 253.

The reason for writing this book is well stated by the author in her preface as follows: "My excuse must be that many of the best herbals, especially the earlier ones, are not easily accessible, and after experiencing keen delight from them myself, I have felt that some account of these works, in connection with reproductions of typical illustrations, might be of interest to others." A little later she says more specifically: "The main object of the present book is to trace in outline the evolution of the *printed herbal* in Europe between the years 1470 and 1670; primarily from a botanical, and secondarily from an artistic, standpoint."

In carrying out this object the author divides her book into nine chapters, whose headings will give a fair idea of its scope, as follows: I. The Early History of Botany (9 pages); II. The Earliest Printed Herbals (23 pages); III. The Early History of Herbals in England (12 pages); IV. The Botanical Renaissance of the Sixteenth and Seventeenth Centuries (72 pages); V. The Evolution of the Art of Plant Description (15 pages); VI. The Evolution of Plant Classification (20 pages); VII. The Evolution of the Art of Botanical Illustration (50 pages); VIII. The Doctrine of Signatures, and Astrological Botany (17 pages); IX. Conclusions (6 pages). In addition there are two appendices, I., containing a Chronological List of the Principal

Herbals and Related Botanical Works Published between 1470 and 1670 (14 pages), and II., containing A List in Alphabetical Order of the Principal Critical and Historical Works dealing with the Subjects Discussed in this Book (6 pages). A good index completes the volume.

In the first chapter we find some suggestive sentences. "From the very beginning of its existence, the study of plants has been approached from two widely separated standpoints—the philosophical and the utilitarian. Regarded from the first point of view, botany stands on its own merits as an integral branch of natural philosophy, whereas from the second it is merely a by-product of medicine or agriculture. This distinction, however, is a somewhat arbitrary one; the more philosophical botanists have not disdained at times to consider the uses of herbs, and those who entered upon the subject with a purely medical intention have often become students of plant life for its own sake. At different periods in the evolution of the science one or other aspect has predominated, but from classical times onwards it is possible to trace the development of these two distinct lines of inquiry, which have sometimes converged, but more often pursued parallel and unconnected paths." From which it will be seen that the advocates of "practical" botany to-day are but the modern representatives of the utilitarian schoolmen of the past.

The earliest printed book containing "strictly botanical information," we are told, was a work by Bartholomew, "*Liber de Proprietatibus Rerum*," which appeared about 1470. Quotations of text or figures are given from the "*Ortus Sanitatus*" (1491), "*The Grete Herball*" (1526), Brunfels's "*Herbarum vivae Eicones*" (1530), Turner's several works (1538-1551), Gerard's "*Herball*" (1597), the works of Bauhin, Dodoens, Lobelius and many others. The illustrations are most interesting, as showing the development of scientific drawing. Some of the earlier representations of plants were little more than suggestions of their appearance (and often of habitat, also), while others, though crude, actu-

ally gave a good idea of the characteristic appearance of the plants. The early artists appear to have conventionalized many of their drawings after fashions of their own, then perhaps familiar to the reader, but now not understood.

The chapter on the Doctrine of Signatures (VIII.) will repay reading, especially by the younger school of botanists of to-day. Will the time ever come when the botanists of some later century will look back to our beliefs with feeling similar to those we have when we read about the doctrine of signatures?

CHARLES E. BESSEY

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*Vergleichende Physiologie Wirbelloser Tiere.*  
Von Professor Dr. H. JORDAN. Erster Band,  
Die Ernährung. Jena, Gustav Fischer.  
1913. 8vo. Pp. xxii + 738, 277 text-figures.

There is no telling to what extent our libraries will need enlargement if Professor Jordan carries to completion his encyclopedic "*Physiology of Invertebrates*," for the 738 pages on Nutrition are to be followed by sections on Respiration, Metabolism, Excretion, Movement, the Nervous System, the Sense Organs and "Psychology."

Excluding the vertebrates, except for the necessary comparisons, and omitting entirely the physiology of reproduction, the plan, as outlined, is to present, with "the greatest unity attainable, a 'biological' treatment of the sum total of the phenomena that make up the life of the individual."

The first installment of this full-grown undertaking begins with a definition of life to which we can not subscribe, and a scene of some comic value in which teleology is shown the door, but asked to leave behind her extremely useful vocabulary. After this follows a systematic treatment of the phenomena of nutrition in all the usual groups of invertebrates, the material under each type or subtype being conveniently divided so that a discussion of the food, together with its modes of capture, always precedes an analysis of the various digestive processes and a discussion of the origin and nature of the involved se-